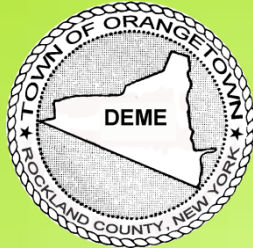




James J. Dean
Superintendent
of Highways



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Aric Gorton
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Parks & Recreation



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BROOKER ENGINEERING, PLLC

**Homes For Heroes
Green Infrastructure
Bio-Retention &
Stormwater
Wetlands Project**



HOMES FOR HEROES

GREEN INFRASTRUCTURE BIO-RETENTION

STORMWATER WETLANDS PROJECT

CAMP SHANKS FRETCH

CAMP SHANKS
50TH ANNIVERSARY
WORLD WAR II
1941 - 1945

MAP OF DEVELOPER FROM PERM. RECORDATION DATE 1984, 1985

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Some 1.3 million soldiers called it "Last Stop USA," but the largest U.S. Army post of construction on the East Coast during World War II was officially known as Camp Shanks. From the day it opened on Jan. 4, 1941 until it ceased operations on July 22, 1945, 298,000 soldiers of Shanks were greeted with military efficiency, sheltered by the roofs of great convalescent and recreation centers and provided bank beds, on which thousands of soldiers were written home. Letters were sent and money was received. The camp was a place where men would never return.

The 50th anniversary was celebrated in 1991.

After the war, the grounds and buildings were used for housing by veterans and their families as former GI's went to college on the GI Bill. In 1956, when Rockland was designated a national historic landmark, Shanks Village was closed and the land sold to developers.

These days all that remains of Camp Shanks and Shanks Village are a few buildings held by the National Guard and a former military housing area. In the middle of the Betty Ross Estates, which sits on the old campgrounds, is a memorial to Shanks veterans.

CAMP SHANKS
1943 - 2013
70th Anniversary
Orangetown, NY

CAMP SHANKS FRETCH

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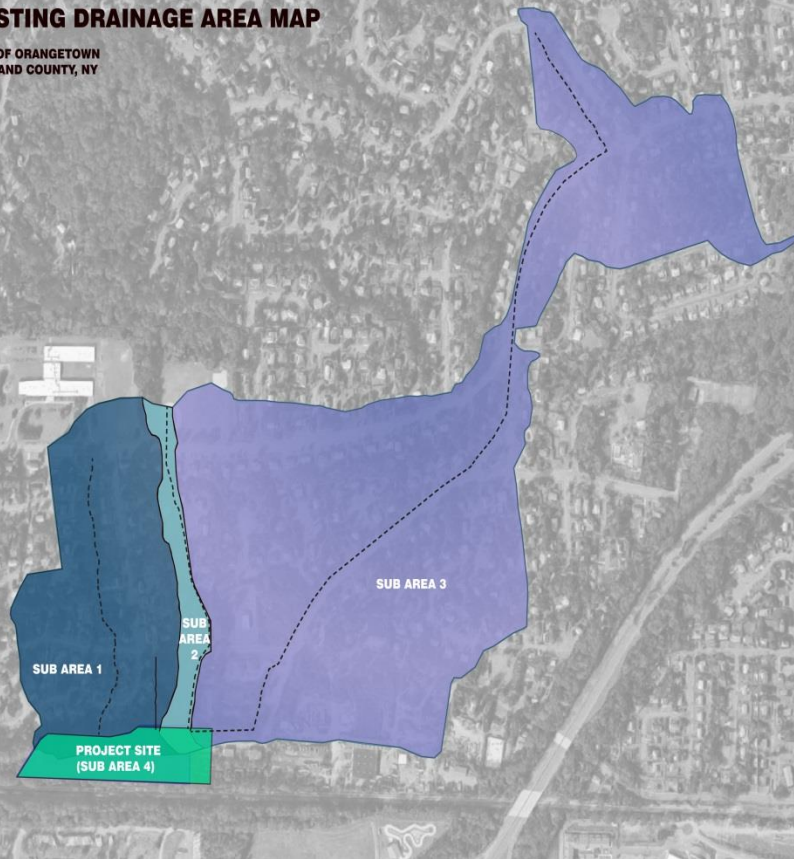
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EXISTING DRAINAGE AREA MAP

TOWN OF ORANGETOWN
ROCKLAND COUNTY, NY



HOMES FOR HEROES GREEN INFRASTRUCTURE BIO-RETENTION STORMWATER WETLANDS

PROJECT DESCRIPTION

- The Town of Orangetown intends to remove a large amount of asphalt surface and create a bio-retention stormwater wetlands at 335 Western Highway in Tappan to reduce impervious surface, reduce water quantity, encourage water infiltration and improve water quality.
- The Town intends to remove approximately 20,000 square feet of asphalt over an area of 5 acres and re-vegetate the exposed space to construct the bio-retention area which could treat and store a drainage area of about 20 acres.



HOMES FOR HEROES **GREEN INFRASTRUCTURE** **BIO-RETENTION** **STORMWATER WETLANDS**

PROJECT HISTORY

- **On December 10, 2015 the New York State Regional Economic Development Councils and the Environmental Facilities Corp. awarded the Town of Orangetown \$895,000 for the construction of the bio-retention and stormwater wetlands through the Green Innovation Grant Program.**
- **In December of 2016 the Town obtained 6.387 acres from the U.S. Department of Health and Human Services for this GIGP.**
- **The Engineering Consultant has completed a 90% design for the construction of this project.**

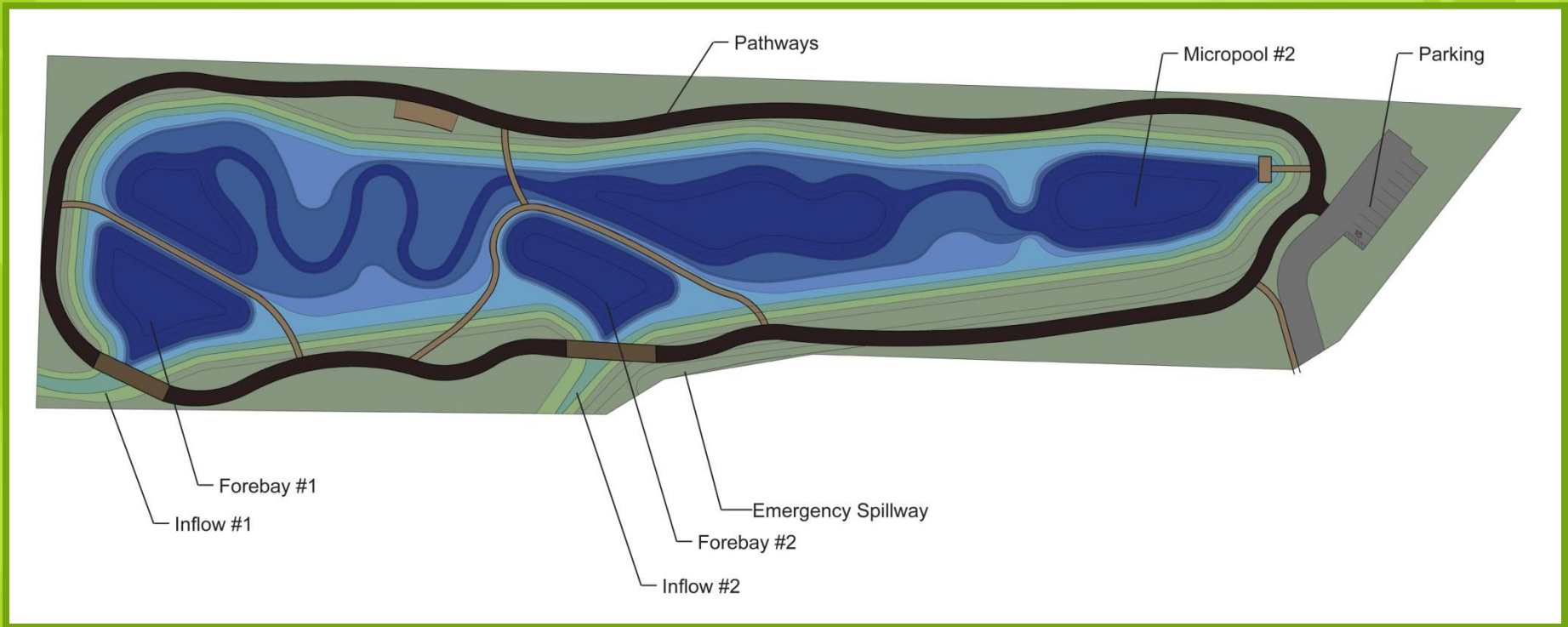


HOMES FOR HEROES GREEN INFRASTRUCTURE BIO-RETENTION STORMWATER WETLANDS PROJECT



Grading & Drainage Plan

HOMES FOR HEROES GREEN INFRASTRUCTURE BIO-RETENTION STORMWATER WETLANDS PROJECT

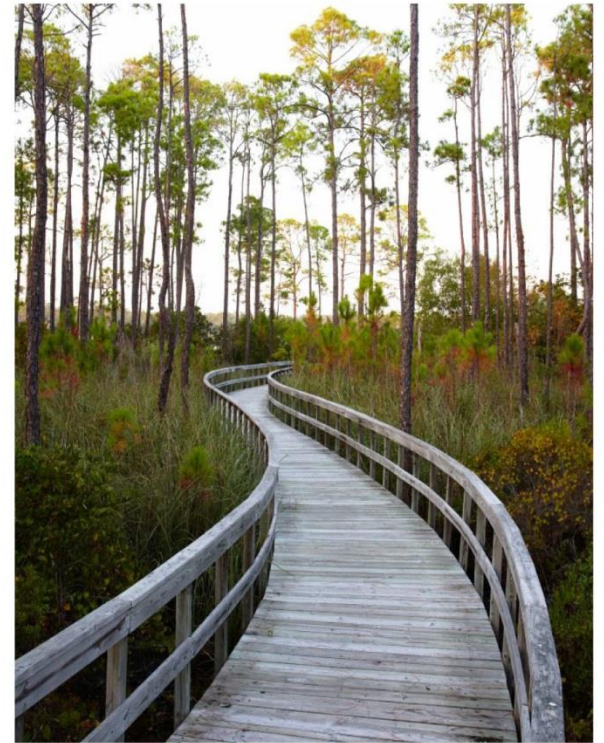


HOMES FOR HEROES GREEN INFRASTRUCTURE BIO-RETENTION STORMWATER WETLANDS PROJECT

Overlook Precedents:



Pathway Precedents:



Signage and Seating Precedents:



HOMES FOR HEROES GREEN INFRASTRUCTURE BIO-RETENTION STORMWATER WETLANDS PROJECT

Orangetown Rain Garden

The Rockland County Soil & Water Conservation District (RC SWCD) proudly sponsored the Orangeburg Library Rain Garden installed in October 2015. The RC SWCD was established in 1965 and is responsible for developing Soil and Water Conservation District programs to protect and conserve soil, water, prime and unique farmland, wildlife, energy and other renewable resources to meet the needs of the local land user on non-federal lands. The Board of Directors represent the County's five towns. They are appointed by the County Executive and confirmed by the County Legislature. Current (2016) Board of Directors are Town Highway Superintendents:

James J. Dean, Orangetown
George Wargo Jr., Haverstraw
Tony Sharon, Ramapo
Larry Brisning, Stony Point
Frank DiZenzo, Clarkstown

Why was the rain garden placed here?

Local knowledge provided that the current site of the rain garden had experienced trends in flooding, washing out water directly into the nearby roadway which was hazardous to drivers and decreased overall water quality into an already impacted stream known as the Sparkill Creek. To remedy these issues, a rain garden and recharge basin pump was installed which would decrease the sheet flow from the roof leader into the nearby road. According to the NY State Stormwater Management Design Manual and NY State guidelines, all rain gardens should be placed roughly 30 feet from a downspout, at least 10 feet from basement foundations, reduce erosion and be free of steep slopes.



Photo by Stephen Murray, Orangetown Highway Department

Fun Fact!

The soil of the rain garden is made up of recycled crushed glass provided by the Rockland County Solid Waste Management Authority. This mixture of glass and gravel with the natural soil allows the infiltrating water to be dispersed throughout the ground evenly, which assists with drainage by decreasing pooling and flooding.
The crushed glass is available at no cost at the Rockland County Solid Waste Management Authority; contact Denis O'Donnell via phone at (845) 753-2200.

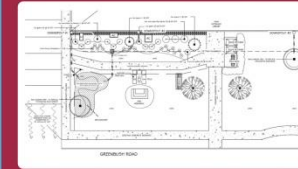
The Rockland County Soil & Water Conservation District is committed to encouraging municipalities and residents to conserve water and to protect our existing water resources.

Green Infrastructure projects are a unique tool to both educate the public on ways to conserve our water resources and an aesthetically appealing way to increase groundwater recharge and reduce flooding.

Rain gardens are a small depression in the landscape where a mixture of drought tolerant, native and high water plants slowly filter water into the ground- increasing groundwater recharge and water quality as well as decreasing flooding.

What is a recharge basin?

An overflow mechanism that helps store and discharge excess amounts of water during high precipitation events is located next to the rain garden. This chamber can expel excess water that the rain garden cannot hold during high storm events into a nearby storm drain system or waterway. As the rain garden is intended to treat small volumes of Stormwater according to the NY State Stormwater Management Design Manual, the chamber acts as a secondary system to protect the function of the rain garden and reduce flooding.



Rain Garden Specifications

Site: 1000 N. 10th Street, Orangeburg, NY 10962. The RC SWCD is responsible for the design and installation of the rain garden. The rain garden is located at the intersection of N. 10th Street and N. 10th Avenue. The rain garden is located at the intersection of N. 10th Street and N. 10th Avenue. The rain garden is located at the intersection of N. 10th Street and N. 10th Avenue.

Main Rain Garden Plant Schedule

Plant Name	Quantity
Blackberry	10
Blueberry	10
Blackberry	10
Blackberry	10
Blackberry	10
Blackberry	10
Blackberry	10
Blackberry	10
Blackberry	10
Blackberry	10

Recharge Basin Specifications

Recharge Basin: 10' x 10' x 18" deep. The recharge basin is located at the intersection of N. 10th Street and N. 10th Avenue. The recharge basin is located at the intersection of N. 10th Street and N. 10th Avenue.



What are the functions of a rain garden?

- Increase groundwater recharge
- Decrease flooding
- Create aesthetic appeal
- provide habitat for wildlife
- Increase water quality



Photo by Nicole Latta, RC SWCD. Rain Garden, Orangeburg, Spring 2016.

HOMES FOR HEROES

GREEN INFRASTRUCTURE BIO-RETENTION

STORMWATER WETLANDS PROJECT

TREES



NAME: BLACK BIRCH - *Betula nigra*
 SIZE: 40'-70' HT. / 40'-60' W
 BLOOM TIME: SPRING
 SUN REQUIREMENTS: FULL SUN
 BROWN BARK, FALL COLOR: YELLOW



NAME: GREEN ASH - *Fraxinus pennsylvanica*
 SIZE: 50'-70' HT. / 35'-50' W
 BLOOM TIME: APRIL TO MAY
 SUN REQUIREMENTS: FULL SUN



NAME: COMMON WITCH HAZEL - *Hamamelis virginiana*
 SIZE: 15'-20' HT. / 15'-20' W
 BLOOM TIME: OCTOBER TO DECEMBER
 SUN REQUIREMENTS: FULL SUN TO PART SHADE
 FRAGRANT FLOWERS



NAME: EASTERN RED CEDAR - *Juniperus virginiana*
 SIZE: 40'-50' HT. / 8'-25' W
 SUN REQUIREMENTS: FULL SUN
 EVERGREEN



NAME: SWEET GUM - *Liquidambar styraciflua*
 SIZE: 60'-80' HT. / 40'-60' W
 BLOOM TIME: APRIL TO MAY
 SUN REQUIREMENTS: FULL SUN



NAME: BLACK GUM / SOUR GUM - *Nyssa sylvatica*
 SIZE: 30'-50' HT. / 20'-30' W
 BLOOM TIME: MAY TO JUNE
 SUN REQUIREMENTS: FULL SUN
 HIGH WILDLIFE VALUE



NAME: SWAMP TUPELO - *Nyssa sylvatica var. silvestris*
 SIZE: 60'-80' HT. / 40' W
 BLOOM TIME: EARLY SPRING
 SUN REQUIREMENTS: FULL SUN, PART SHADE
 NOT SALE TOLERANT



NAME: SWAMP WHITE OAK - *Quercus bicolor*
 SIZE: 50'-60' HT. / 50'-60' W
 BLOOM TIME: APRIL
 SUN REQUIREMENTS: FULL SUN
 NERVE TO SWAMP, BUT HAS GOOD UPLIGHT RESISTANCE



NAME: BLACK WILLOW - *Salix nigra*
 SIZE: 30'-60' HT. / 30'-60' W
 BLOOM TIME: MARCH TO APRIL
 SUN REQUIREMENTS: FULL SUN, PART SHADE

SHRUBS



NAME: BLACK CHOKEBERRY - *Aronia melanocarpa*
 (Monter / Ingersoll Beauty)
 SIZE: 7'-3' HT. / 4'-9" W
 BLOOM TIME: MAY
 SUN REQUIREMENTS: FULL SUN, PART SHADE



NAME: BUTTONBUSH - *Ophelia occidentalis*
 SIZE: 5'-12' HT. / 4'-8" W
 BLOOM TIME: JUNE
 SUN REQUIREMENTS: FULL SUN, PART SHADE
 ATTRACTS BUTTERFLIES AND BIRDS



NAME: RED TWIG DOGWOOD - *Cornus sericea*
 SIZE: 8'-9' HT. / 7'-10" W
 BLOOM TIME: MAY TO JUNE
 SUN REQUIREMENTS: FULL SUN TO PART SHADE
 EVERGREEN



NAME: INKBERRY - *Ilex glabra*
 SIZE: 3'-8' HT. / 5'-8" W
 BLOOM TIME: MAY TO JUNE
 SUN REQUIREMENTS: FULL SUN TO PART SHADE
 EVERGREEN



NAME: AMERICAN HOLLY - *Ilex opaca*
 SIZE: 15'-30' HT. / 10'-20" W
 BLOOM TIME: JULY TO SEPTEMBER
 SUN REQUIREMENTS: FULL SUN TO PART SHADE
 EVERGREEN, ATTRACTS BIRDS



NAME: WINTERBERRY - *Ilex verticillata*
 SIZE: 3'-12' HT. / 3'-12" W
 BLOOM TIME: JUNE TO JULY
 SUN REQUIREMENTS: FULL SUN TO PART SHADE
 ATTRACTS BIRDS



NAME: SPICEBUSH - *Lindera benzoin*
 SIZE: 6'-12' HT. / 6'-12" W
 BLOOM TIME: MARCH
 SUN REQUIREMENTS: FULL SUN TO PART SHADE



NAME: BAYBERRY - *Myrica pensylvanica*
 SIZE: 5'-10' HT. / 5'-10" W
 BLOOM TIME: MAY
 SUN REQUIREMENTS: FULL SUN TO PART SHADE
 FRAGRANT LEAVES, ATTRACTS BIRDS



NAME: AMERICAN BLACK ELDERBERRY - *Sambucus canadensis*
 SIZE: 5'-10' HT. / 3'-12" W
 BLOOM TIME: JUNE TO JULY
 SUN REQUIREMENTS: FULL SUN TO PART SHADE
 ATTRACTS WILDLIFE

HERBACEOUS



NAME: SWEET FLAG - *Acorus calamus*
 SIZE: 2'-2.5' HT. / 1.5'-2" W
 BLOOM TIME: NON-FLOWERING
 SUN REQUIREMENTS: FULL SUN TO PART SHADE



NAME: SWAMP MILKWEED - *Asclepias incarnata*
 SIZE: 4'-5' HT. / 2'-3" W
 BLOOM TIME: JUNE TO AUGUST
 SUN REQUIREMENTS: FULL SUN
 ATTRACTS BUTTERFLIES



NAME: BUTTERFLY WEED - *Asclepias tuberosa*
 SIZE: 1'-2.5' HT. / 1'-1.5" W
 BLOOM TIME: JUNE TO AUGUST
 SUN REQUIREMENTS: FULL SUN
 ATTRACTS BUTTERFLIES



NAME: JOE PYE WEED - *Euthrochium dubium* 'Baby Joe'
 SIZE: 2'-3' HT. / 1'-2" W
 BLOOM TIME: JULY TO SEPTEMBER
 SUN REQUIREMENTS: FULL SUN
 FRAGRANT FLOWERS, ATTRACTS BUTTERFLIES



NAME: JOE PYE WEED - *Eupatorium purpurum*
 SIZE: 5'-7' HT. / 2'-4" W
 BLOOM TIME: JULY TO SEPTEMBER
 SUN REQUIREMENTS: FULL SUN, PART SHADE
 ATTRACTS BUTTERFLIES



NAME: BLUE FLAG - *Iris versicolor*
 SIZE: 2'-2.5' HT. / 2'-2.5" W
 BLOOM TIME: MAY TO JUNE
 SUN REQUIREMENTS: FULL SUN TO PART SHADE
 GROWS IN 2"-4" OF SHALLOW STANDING WATER



NAME: BLUE CARDINAL FLOWER - *Lobelia siphilitica*
 SIZE: 2'-3' HT. / 1'-1.5" W
 BLOOM TIME: JULY TO SEPTEMBER
 SUN REQUIREMENTS: FULL SUN TO PART SHADE



NAME: PICKERS WEED - *Proteridella cordata*
 SIZE: 2'-4' HT. / 1.5'-2" W
 BLOOM TIME: JULY TO OCTOBER
 SUN REQUIREMENTS: FULL SUN, PART SHADE
 DEEP BLOOM, PROVIDES NECTAR FOR BUTTERFLIES



NAME: GREEN ARROW ARUM - *Peltandra virginica*
 SIZE: 1.5'-2' HT. / 1.5'-2" W
 BLOOM TIME: APRIL TO JUNE
 SUN REQUIREMENTS: FULL SUN TO SHADE

HERBACEOUS CONT.



NAME: NEW YORK IRONWEED - *Vernonia noveboracensis*
 SIZE: 4'-6' HT. / 3'-4" W
 BLOOM TIME: AUGUST TO SEPTEMBER
 SUN REQUIREMENTS: FULL SUN



NAME: REEDTOP - *Agrostis alba*
 SIZE: TO 6' HT.
 BLOOM TIME: JUNE TO AUGUST
 SUN REQUIREMENTS: FULL SUN
 LOW SALT TOLERANCE



NAME: BIG BLUE STEM - *Andropogon gerardii*
 SIZE: 4'-6' HT. / 2'-3" W
 BLOOM TIME: JUNE TO AUGUST
 SUN REQUIREMENTS: FULL SUN
 HIGH WILDLIFE VALUE: GRASS FOR LONGLEGS, FOOD FOR DEER



NAME: BLUEJOINT GRASS - *Calamagrostis canadensis*
 SIZE: 3'-5' HT.
 BLOOM TIME: JUNE TO AUGUST
 SUN REQUIREMENTS: FULL SUN TO PART SHADE



NAME: WET FLATTED SEDGE - *Carex stipata*
 SIZE: 2'-3' HT. / 3" W
 BLOOM TIME:
 SUN REQUIREMENTS: FULL SUN, LIGHT SHADE



NAME: FOX SEDGE - *Carex vulpinoidea*
 SIZE: 1'-3' HT. / 0.5'-2" W
 BLOOM TIME: MAY TO JULY
 SUN REQUIREMENTS: FULL SUN, PART SHADE



NAME: SWITCHGRASS - *Panicum virgatum*
 SIZE: 2'-6' HT. / 2'-3" W
 BLOOM TIME: JULY TO FEBRUARY
 SUN REQUIREMENTS: FULL SUN TO PART SHADE
 FRAGRANT FLOWERS, ATTRACTS BIRDS



NAME: PINE BARREN DROPSEED - *Sporobolus heterostachyus*
 SIZE: 2'-3' HT. / 2'-3" W
 BLOOM TIME: AUGUST TO SEPTEMBER
 SUN REQUIREMENTS: FULL SUN
 FRAGRANT FLOWERS, ATTRACTS BIRDS



NAME: SOFTSTEM BULRUSH - *Scirpus atrovirens*
 SIZE: 4'-8' HT. / 3'-6" W
 BLOOM TIME: MAY TO SEPTEMBER
 SUN REQUIREMENTS: FULL SUN
 BEST GROWING IN STANDING WATER, UP TO 10" DEEP

HOMES FOR HEROES
GREEN INFRASTRUCTURE BIO-RETENTION
STORMWATER WETLANDS PROJECT

QUESTIONS & COMMENTS

HOMES FOR HEROES
GREEN INFRASTRUCTURE BIO-RETENTION
STORMWATER WETLANDS PROJECT

CONTACT INFORMATION

Jim Dean, Superintendent of Highways

Town of Orangetown

119 Route 303

Orangeburg, NY10962

(845) 359-6500

(845) 359-6062

highwaydept@orangetown.com

Stephen F. Munno

Senior Administrative Assistant

smunno@orangetown.com